

Course Title	Principles of Cell Biology and Genetics				
Course Code	DES115				
Course Type	Compulsory				
Level	Bachelor of Dentistry				
Year / Semester	1 st year / 1 st semester				
Teacher's Name	TBA				
ECTS	5	Lectures / week	3 hrs / 13 weeks + exam week	Laboratories / week	2 hrs / 13 weeks
Course Purpose and Objectives	<p>This course is intended to give to the students a broad overview of cellular and molecular biology with respect to human cells in health and disease. This course is designed to acquaint students with the structures and functions of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles as well as with the flow of genetic information from DNA to RNA and proteins. In addition, students will learn the basic principles of inheritance at the molecular, cellular and organismal levels. Students will also understand causal relationships between molecule/cell level phenomena and organism-level patterns of heredity.</p> <p>The course is designed to integrate with lectures, laboratories, group discussions, Computer Assisted Learning (CAL) and assignments. A key part of the course will be the ability to dissect problem scenarios into its key features by thinking in an integrated manner and to looking at problems from different perspectives.</p>				
Learning Outcomes	<p>Upon successful completion of this course students should be able to:</p> <ul style="list-style-type: none"> • Describe the intricate relationship between cells and their environment as well as cellular structures and their corresponding functions. • Summarize the cellular processes and mechanisms that lead to changes in cellular functions as well as examples of pathological states • Discuss the different transmembrane transport mechanisms and their importance in the cellular physiology • Describe the mechanisms of cellular division, the phases of the cell division cycle and its regulatory mechanisms. 				

	<ul style="list-style-type: none"> • Discuss the effects of ageing on the cellular structure and function and to understand the process of cellular differentiation and apoptosis. • Describe molecular mechanisms of inheritance • Discuss processes of chromosome segregation in mitosis and meiosis and explain the aberrations in chromosome number and structure as well as inheritance of monogenic, polygenic and multifactorial traits and diseases 		
Prerequisites	None	Co-requisites	None
Course Content	<p>In that regard, students will familiarize themselves with the following Modules:</p> <ul style="list-style-type: none"> • Introduction to cell structure and function. • Chemical components of cells. • Protein structure, function and regulation in health and disease. • Cell membranes: structure, function and transmembrane transport. • Intracellular compartments: organelles, cytoskeleton and Protein Transport. • DNA structure, function, replication, repair and associated diseases. • DNA Organization: from Genes to Genomes-Chromosomal organization of Human Genome • How cells read the genome: from DNA to RNA (Transcription). • How cells read the genome: from RNA to Proteins (Translation). • Control of gene expression. • Modern recombinant DNA technologies and gene therapies. • Cell communication and Cell signaling. • Cell division and Cell Cycle. • Cell Survival and Apoptosis. • Regulation of Cell proliferation and Cancer. • Stem Cells in tissue maintenance and renewal, Stem cell-based therapies and Biomedical applications. • Introduction to human Genetics: Chromosomes, Meiosis and Gametogenesis. • Aberrations in Chromosome Number and Structure. • Inheritance of traits and diseases: Typical Mendelian inheritance. • Inheritance of traits and diseases: Atypical Mendelian inheritance. • Genetic analysis, assessment and counseling. • Introduction to laboratory safety. • 3D animation of Human Cell. • Searching Evidence-based Biomedical literature: PubMed online search engine. • Cell Physiology and Membrane permeability-I (Onion cells). 		

	<ul style="list-style-type: none"> • Cell Physiology and Membrane permeability-II (human red blood cells). • Isolation of Genomic DNA from Human Cells. • Nucleic Acid analysis: RNA isolation and spectrophotometric detection of RNA concentration. • Nucleic Acid analysis: DNA agarose gel electrophoresis. • Microscopic examination of human Cell Nucleus and chromosomal staining with DAPI. • Interpreting Biomedical data from Plots and Graphs. • Analyze Polypeptide and DNA sequence Data. • Searching Human Genetics Databases for genes, mutations, traits, diseases and disorders. 								
Teaching Methodology	Face-to-face								
Bibliography	<p>Essential Cell Biology (fourth edition), Alberts, Bray, Hopkins, Johnson, Lewis, Raff, Roberts, Walter; Garland Science; 2014</p> <p>Essential Medical Genetics (sixth edition), Connor M., Ferguson M.; Wiley-Blackwell; 2011</p> <p>ADDITIONAL RECOMMENDED TEXTBOOKS:</p> <p>Human Genetics: Concepts and Applications (eleventh edition), Ricki Lewis; McGraw-Hill Education; 2015</p> <p>Molecular Cell Biology (eighth edition), Harvey Lodish, Arnold Berk, Chris A. Kaiser, et al.; Freeman and Company; 2016</p>								
Assessment	<table border="1"> <tr> <td>Final Examination</td> <td>60%</td> </tr> <tr> <td>Assignment / Lab</td> <td>30%</td> </tr> <tr> <td>Participation and attendance</td> <td>10%</td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </table>	Final Examination	60%	Assignment / Lab	30%	Participation and attendance	10%	Total	100%
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